

APPENDIX M – PROPOSED MITIGATION

INTRODUCTION

The Maryland Port Administration (MPA) is proposing the construction of a dredged material containment facility (DMCF) in the vicinity of the Masonville Marine Terminal. Construction of the facility would require mitigation to offset the facility's impacts. The proposed DMCF would fill 130 acres of tidal open water (one of which is resulting from the need to move sunken barges outside the DMCF footprint). In addition, the project would bury 10 acres of upland habitat within the Chesapeake Bay Critical Area buffer, and disturb approximately 1 acre of vegetated wetlands (delineated as 0.4 acres) and 0.38 acres of SAV. The following section details the MPA's proposed mitigation package and its development. Included in this section are:

1. A description of the area impacted by the facility,
2. A description of the MPA's public outreach efforts and the public support for the project, and
3. The MPA's proposed mitigation package.

DMCF Impacts - The area impacted by the facility and its habitat value were studied in great detail during feasibility level studies conducted by the MPA. These studies were instrumental in the development of the mitigation plan and defined both the quantity and quality of the impacted area.

Quantity - Figure M-1 illustrates the proposed area of the DMCF footprint, and Table M-1 quantifies the areas of open water, uplands, and vegetated wetlands, which would be affected by the proposed project.



Figure M-1. Extent of Area Impacted by Proposed Facility

Notes: The design for the proposed facility uses sand and clay dikes to contain material dredged from the navigation channels within Baltimore Harbor. The green line delineates the footprint of the proposed facility. Table M-1 breaks down the types of areas affected.

Table M-1. Breakdown of Affected Areas

Line Item	Area (acres)
Open Water	130
Upland	10
Vegetated Wetlands	1
Total Affected Area	141

Existing Conditions - The quality of the 130 acres of affected open water habitat is poor. Benthic sampling within the affected area has shown the benthic condition to range from meeting restoration goals to severely degraded. The existing upland habitat (10 acres) within the alignment exists on fastland created from dredged material and is not providing unique or critical habitat. The vegetated wetlands are small, covering no more than 1 acre of land. One of these exists on fastland from past dredged material placement and the other is located in an industrial area, at the end of KIM channel. Both the upland areas and vegetated wetlands provide fragmented habitat exposed to noise and light from industrial activities. Chapter 2 of the proposed Masonville DEIS provides additional detail on the existing conditions of the proposed project site.

Public Outreach and Support - Recognizing that an extensive mitigation package would be required for the Masonville project, the MPA turned to the surrounding community and Port of Baltimore stakeholders for guidance on mitigation projects and community enhancements. Outreach was accomplished through Harbor Team meetings and discussions with various community groups. The community and stakeholders responded by offering the following list of suggestions and ideas for improving the adjacent Masonville Cove:

- | | |
|--------------------------|---------------------------|
| 1) Limited public access | 7) Passive recreation |
| 2) Clean shoreline | 8) Education center |
| 3) Shoreline trails | 9) Canoe/kayak launch |
| 4) Observation towers | 10) Wetlands |
| 5) Habitat enhancements | 11) Community stewardship |
| 6) Bird sanctuary | |

These suggestions were instrumental in shaping the MPA's mitigation plan. This public involvement has created an atmosphere of support for the Masonville project, which has been publicly endorsed by the Brooklyn-Curtis Bay Coalition, the City of Baltimore, the Living Classrooms Foundation, the National Aquarium in Baltimore, and the Citizens' Advisory Committee.

Mitigation Plan - The MPA developed its mitigation plan by considering the value of the habitat to be impacted by the proposed facility, the surrounding community's suggestions, suggestions from the Bay Enhancement Working Group (BEWG), and comments provided by state and federal agencies. Attachment M-1 lists the elements of the conceptual package, associated acreages, and their estimated cost. Attachment M-2 provides a brief summary of each project within the proposed mitigation package.

The mitigation plan focuses on enhancement of the Masonville Cove. However, initial conversations with regulatory agencies revealed the possible need for additional projects. To determine the appropriate, additional mitigation projects located outside of the Masonville Cove area, the MPA relied on a ranking of projects provided by the BEWG. Attachment M-3 provides the list of projects presented to the BEWG and the ranking that the BEWG assigned them. Also included in this attachment are fact sheets for the projects evaluated (fact sheets were not developed for all of the projects).

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ATTACHMENT M-1

SUMMARY OF PROPOSED MITIGATION PLAN

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Table 1. Summary of Proposed Mitigation Package

Item #	Description	Quantification		Cost			Cumulative Acres
		Quantity	Units	Unit Cost	Item Cost	Cumulative Cost	
Recommended In-Ground Acreage Projects							
1	Wetland Enhancement	2.0	Acres	\$150,000	\$300,000	\$300,000	2
2	Wetland Creation	3.1	Acres	\$155,000	\$480,500	\$780,500	5
3	Non-Tidal Wetland	10.0	Acres	\$100,000	\$1,000,000	\$1,780,500	15
4	Reef and Fish Habitat (subtotal)	92.0	Acres				107
a	Reef and Fish Habitat (Inner Cove)	30.0	Acres	\$31,000	\$930,000	\$2,710,500	
b	Reef and Fish Habitat (Outer Cove)	42.0	Acres	\$31,000	\$1,302,000	\$4,012,500	
c	Shallow Water Substrate Improvement	20.0	Acres	\$20,000	\$560,000	\$4,572,500	
5	Terrestrial Habitat Enhancement and Diversification	10.0	Acres	\$84,000	\$840,000	\$5,412,500	117
6	Beach Creation (in cove)	0.8	Acres	\$140,000	\$112,000	\$5,524,500	127
7	Beach Creation (along dike)*	5.0	Acres	\$40,000	\$200,000	\$5,724,500	132
8	Eel Passage (Bloede/Simpkins Dam, Daniels Dam, Sawmill Creek, Deep Run)	1.0	Project	\$100,000	\$580,000	\$6,304,500	140
9	Shad and Herring Restoration	1.0	Project	\$750,000	\$750,000	\$7,054,500	150
Recommended Additional Projects							
10	Landside and Water- Phase I Cleanup**	25.0	Acres	\$100,000	\$2,500,000	\$9,554,500	175
11	Education Center/Trails (Allocation)	1.0	Project	\$750,000	\$750,000	\$10,304,500	185
12	Education / Research (Allocation)	1.0	Project	\$500,000	\$500,000	\$10,804,500	192
13	Water Quality Monitoring in and Habitat Assessment in Masonville Cove	1.0	Project	\$194,000	\$194,000	\$10,998,500	194
14	Conservation Easement (Approximately 50 Acres in Easement)	25.0	Acres	\$0	\$0	\$10,998,500	219
15	3 Trash Interceptors (including 5 years of maintenance @ \$50,000/year)	3.0	Project	\$500,000	\$1,750,000	\$12,748,500	242
Environmental Benefits from the Masonville DMCF							
16	Sediment/Contaminant Encapsulation	123.0	Acres	\$0			
17	Derelect Vessels (Remediation and Removal)	3.0	Acres	\$3 - \$5 Million			

* The sand beach replaces the otherwise necessary rock armament along the dike. The beach section costs the equivalent of \$40,000 per acre of beach more than the rock.

** These acres are not definite. This option was capped at \$2.5 Million and the current estimate of the number of acres this will cleanup is 25.

Notes:

- 1 Items in blue were recommended by DNR or Baltimore City.
- 2 Items in red indicate options that do not add cost to the mitigation package. However, they are relevant and should be considered when evaluating the package.
- 3 Acreage for items having "Project" units are calculated by dividing the item cost by \$75,000.
- 4 Item number corresponds to the fact sheet number.

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ATTACHMENT M-2

MITIGATION OPTIONS FACT SHEETS

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MITIGATION PROJECTS 1 AND 2
TIDAL WETLAND CREATION AND ENHANCEMENT – MASONVILLE COVE

Location

The proposed wetland creation and restoration projects are located in Masonville Cove in the Patapsco River (Figure 1). The blue hatchings in Figure 1 represent the areas proposed for wetland creation and enhancement.

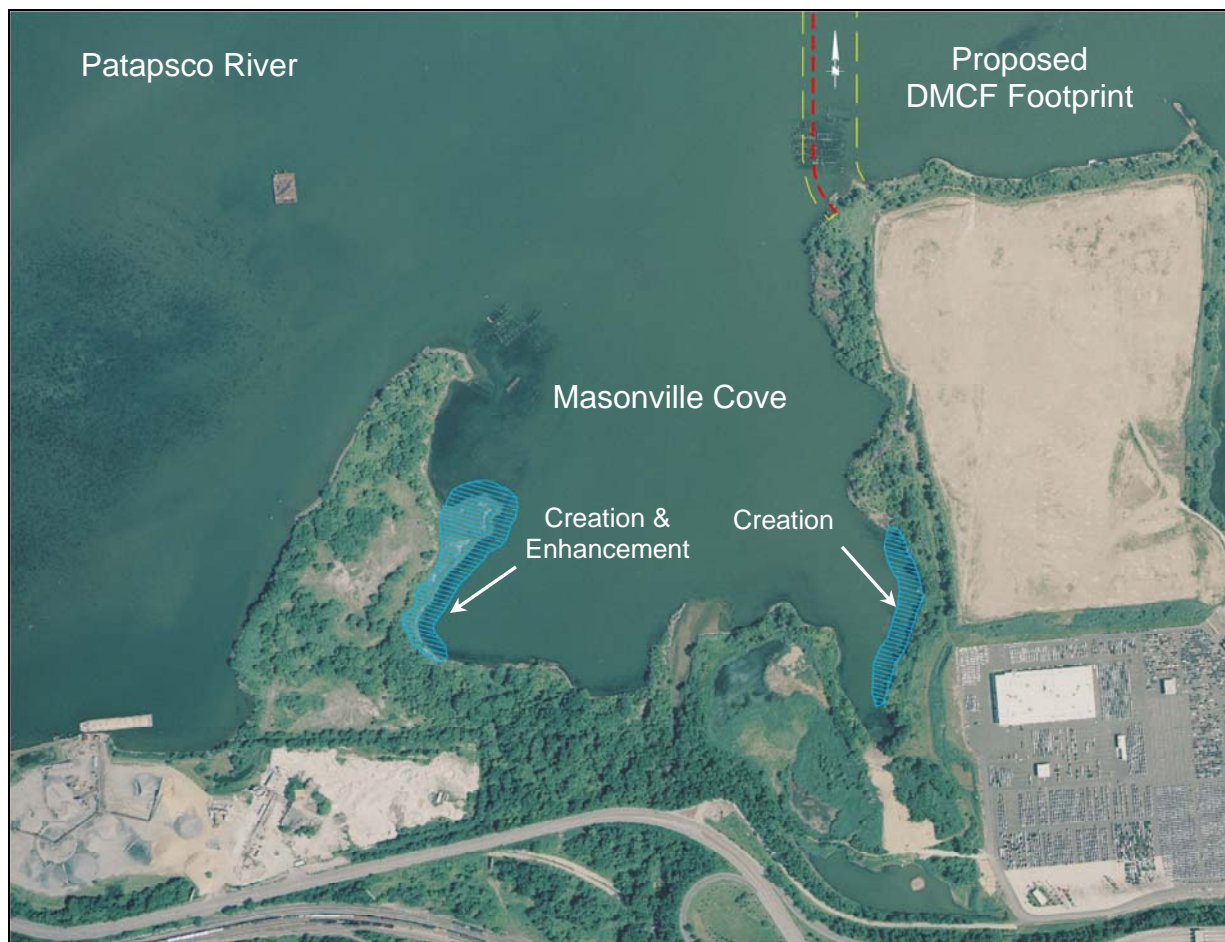


Figure 1. Tidal Wetland Creation and Enhancement in Masonville Cove

Description

Existing Conditions – (Ownership: State of Maryland) – The creation projects on the east and west sides of Masonville Cove are located along the shoreline and in open water. The area that includes both creation and enhancement projects is located in existing tidal wetlands and open water. Existing condition studies found that the water within Masonville Cove provides refuge and forage opportunities for a variety of fish species including juvenile anadromous species, such as white perch (*Morone Americana*), striped bass (*Morone saxatilis*), yellow perch (*Perca flavescens*), and river herring (*Alosa pseudoharengus* and *Alosa aestivalis*), as well as forage species such as minnows, shiners, and silversides. The Cove also provides foraging and resting opportunities for many bird species. Waterfowl are common during the winter months and herons and egrets are common in warmer months. Debris including tires, ceramic insulators, railroad ties, and trash is present in the

shallow water and shoreline within the cove. The substrate consists primarily of fine grained material (silts and clays) with isolated sand pockets. The wetland area included in the enhancement project on the west side of the Cove is dominated by *Phragmites australis*.

Proposed Enhancement – (Scope: 5.1 Acres in Masonville Cove) –

Creation and Enhancement Project - The 1.5 acre creation portion of the creation and enhancement project would include placement of sand to appropriate elevation (+1 to 2 ft MLLW), construction of channels and inlets for hydrodynamic function, and planting of native vegetation. The 2-acre enhancement portion of the creation and enhancement project would include excavation for removal of *Phragmites*, placement of sand to appropriate elevation (+1 to 2 ft MLLW), construction of channels and inlets for hydrodynamic function, and the planting of native vegetation.

Eastern Creation Project – The 1.6-acre eastern creation project would include placement of sand to the appropriate elevation (+1 to 2 ft, MLLW), construction of channels and inlets for hydrodynamic function, and planting of native vegetation.

Benefits – The proposed project would improve substrate conditions and wetland habitat and would enhance of existing wetlands through the diversification of vegetation and improved tidal flushing. There would potentially be an increase in fish forage and refuge opportunities along the south shore of the Patapsco River, which is known to be an important anadromous fish nursery area within the River. The project would also enhance wading bird and waterfowl foraging opportunities.

Conceptual Cost Estimate – The estimated cost for the 1.6-acre eastern creation project is \$248,000. The estimated cost for the 3.5-acre creation and enhancement project is \$533,000. The total cost is estimated at \$781,000 for 5.1 acres of improved habitat. This results in a unit cost of \$153,000 per acre.

MITIGATION PROJECT 3 NON-TIDAL WETLAND CREATION – MASONVILLE COVE

Location

The proposed non-tidal wetland creation and restoration project is located in Masonville Cove in the Patapsco River (Figure 2). The yellow hatching in Figure 2 represents the area proposed for non-tidal wetland creation.

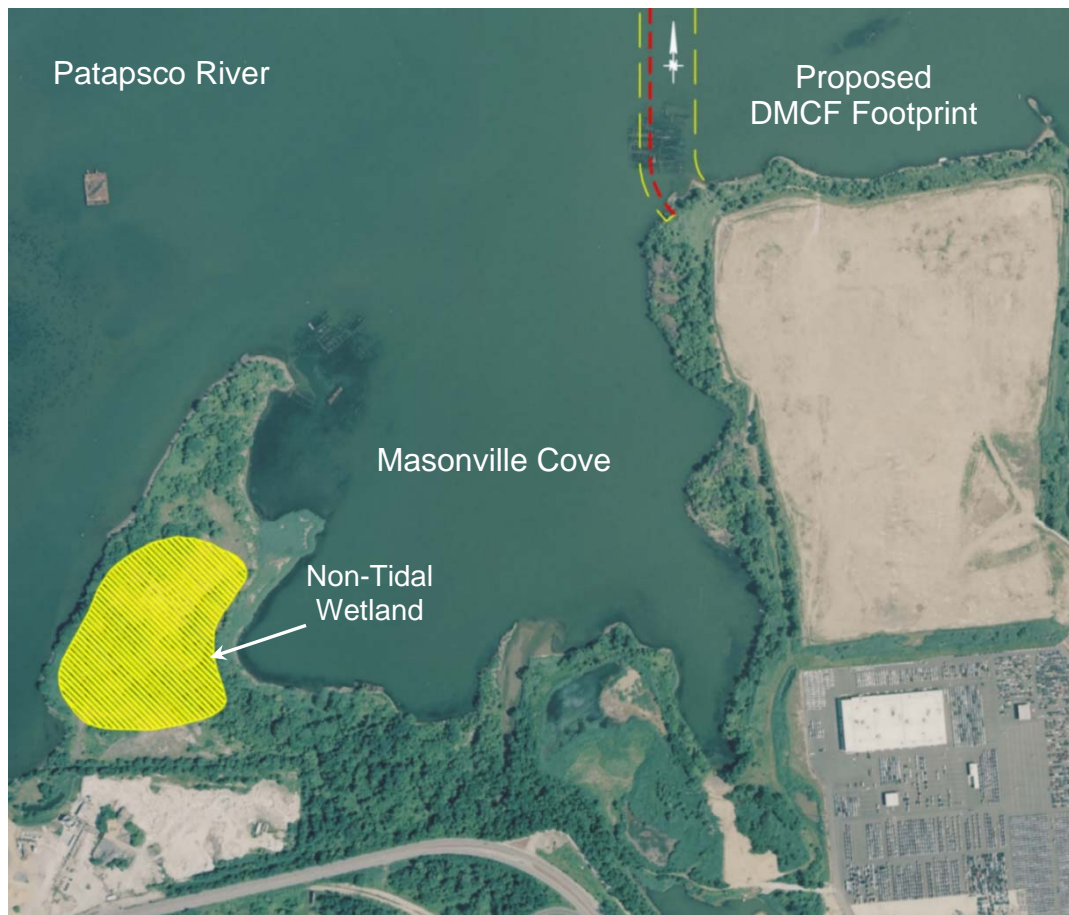


Figure 2. Non-Tidal Wetland Creation at Masonville

Description

Existing Conditions – (Ownership: State of Maryland) – The proposed project is located within the western peninsula that forms Masonville Cove. The area is currently upland with vegetation ranging from sparse groundcover to moderate coverage of small opportunistic trees and shrubs with marginal habitat value. Few bird or mammal species currently use this part of the site. The substrate is not well defined, but it is known that the area contains remnants from previous sand and gravel offloading operations. Some debris is present throughout the proposed project area.

Proposed Enhancement – (Scope: 10 Acres in Masonville Cove) – The 10 acre creation project would include excavation of existing material to achieve appropriate grades, construction of water level

maintenance structures, and planting of native wetland vegetation. The species used for the wetlands planting would be consistent with those recommended by USFWS for wet and moist areas of the Maryland Coastal Plain. Plant species that have been successful in similar wetland creation projects include: switchgrass (*Panicum virgatum*), gamagrass (*Tripsacum dactyloides*), and herbaceous emergent species such as rose mallow (*Hibiscus moscheutos*) and rush species. Plants would be selected to be consistent with the other terrestrial habitat improvements proposed for the cove area to minimize the potential for invasive species and to accommodate an ecosystem-level restoration of the floodplain.

Benefits – Masonville Cove lies in the upper reach of the Patapsco River within the floodplain of the river. There is currently little wildlife utilization of this part of the site. Creation of non-tidal wetlands would enhance the existing area through diversification of vegetation and floodplain habitat. The wetlands would provide refuge and forage opportunities for freshwater fish species that are known to occur in the area, such as shiner and sunfish species. Non-tidal wetlands would also provide additional forage areas for wading and shorebirds and nesting opportunities for floodplain and wetland nesting waterfowl species. These functions are an improvement over the functions of most of the open water habitat within the proposed DMCF footprint which is too deep for wading or shorebird utilization, provides poor in-stream habitat for many fish species, and provides no nesting habitat. Creation of a freshwater wetland would have the addition benefit of providing a freshwater (drinking) source for birds and terrestrial wildlife in the area.

Cost Estimate – The estimated unit cost per acre of non-tidal wetland creation is \$100,000. The total cost is estimated at \$1,000,000 for 10 acres of improved habitat.

MITIGATION PROJECTS 4A AND 4B
REEF AND FISH HABITAT CREATION - INNER AND OUTER MASONVILLE COVE

Location

The proposed reef creation and substrate improvement are located in Masonville Cove in the Patapsco River (Figure 3). The green hatching in Figure 3 identified as the inner and outer Cove represents the area proposed for reef creation.

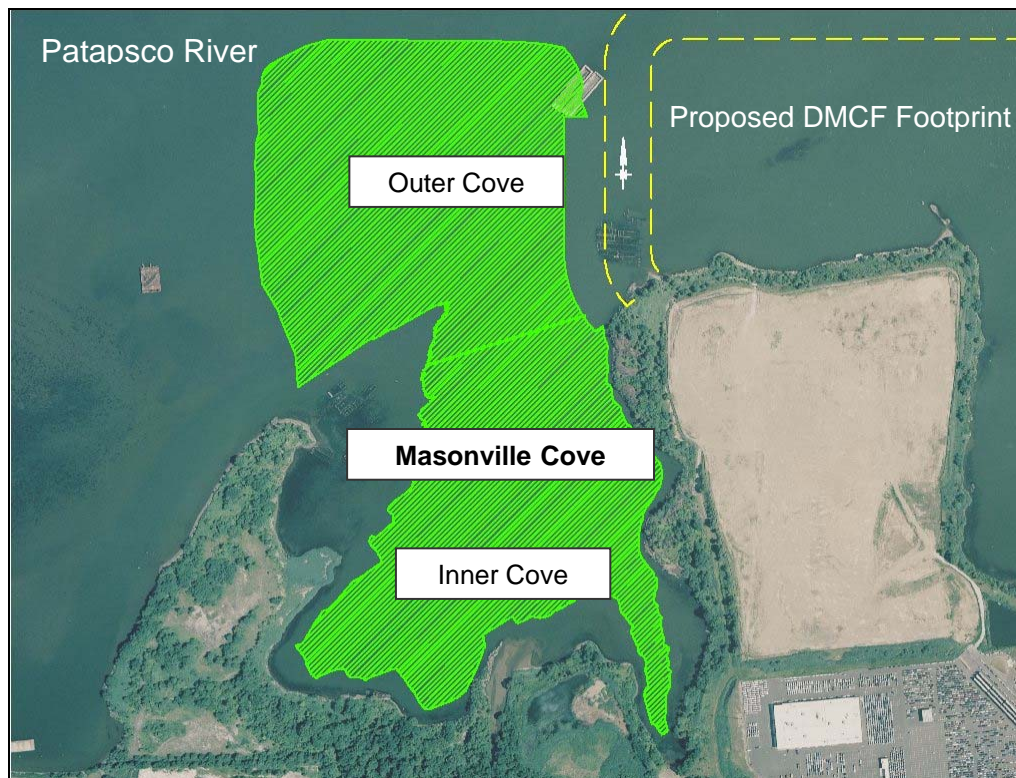


Figure 3. Reef and Fish Habitat Creation in Masonville Cove

Description

Existing Conditions – (Ownership: State of Maryland) – Existing condition studies found that the waters within Masonville Cove provide refuge and forage opportunities for a variety of fish species including juvenile anadromous species, such as white perch (*Morone Americana*), striped bass (*Morone saxatilis*), yellow perch (*Perca flavescens*), and river herring (*Alosa pseudoharengus* and *Alosa aestivalis*), as well as forage species such as minnows, shiners, and silversides. This is expected of natural shoreline areas along the southern shore of the Patapsco River. However, habitat degradation due to water quality and excessive debris (e.g. tires, ceramic insulators, railroad ties, and trash) was apparent. The substrate consists primarily of fine grained material (silts and clays) with isolated sand pockets. The area labeled as outer cove has a marginal-to-poor benthic condition and low-to-average fish utilization for the Baltimore Harbor. The area labeled as inner cove contains some areas that are severely degraded. Fish utilization, based on seining studies, in the inner cove is consistent with other area of the Baltimore Harbor. White perch and young striped bass dominated the open water collections in the proposed reef area outside the cove. The substrate consists primarily of fine grain material.

Proposed Enhancement – (Scope: 30 Acres in Cove) – Prior to reef creation, debris removal would occur under Mitigation Project 10. Improvement of substrate would occur through spreading and creating underwater mounds of sand and gravel and placement of reef balls and rock piles. Also possible is the use of concrete rubble structures. The sand and gravel used to create the reef structures would come from an upland source approved for in-water placement.

Benefits – This project would improve substrate conditions, in-stream habitat, and vertical structure*. Substrate improvements would improve the benthic conditions, which would improve the forage opportunities for fish. Increase of in-stream three-dimensional structure would provide additional habitat for epibenthic colonization, cover for crabs, juvenile and small fish, and foraging sites for larger fish species. Many of the fish species known to utilize the cover are species that would benefit from the improved in-stream refugia. The hard vertical structure would provide substrate for encrusting bivalves such as platform mussels, which are known to occur within the cove, or oysters, which are found elsewhere in the Harbor. Once bivalve colonies establish themselves in the area, their filter feeding is expected to improve water clarity.

Cost Estimate – The estimated cost to improve 30 acres of substrate in the inner cove (nominal one ft thick sand layer with mounding) is \$629,200. The estimated cost to procure, transport, and place reef balls and other structure over 30 acres in the inner cove is \$300,000. The total cost is estimated at \$930,200 for 30 acres of improved habitat in the inner cove. This results in a unit cost of \$31,000 per acre in the inner cove. The estimated cost to improve 42 acres of substrate in the outer cove (nominal 1-ft thick sand layer with mounding) is \$881,000. The estimated cost to procure, transport, and place reef balls and other structure over 42 acres in the outer cove is \$420,000. The total cost is estimated at \$1,301,000 for 42 acres of improved habitat in the outer cove. This results in a unit cost of \$31,000 per acre for the outer cove. The total cost for both the inner and outer cove substrate and habitat improvements is \$2,231,200.

* A survey of available literature was conducted using the Web of Science. Searches included such keywords as “artificial reefs”, “Reef Balls”, “Chesapeake artificial reefs”, and “estuary artificial reefs.” The research included data on all types of artificial reefs, including oil rigs, sunken vessels, geotextile reefs, scrap tires, steel slag, and concrete reefs, from around the world. To select studies that may be relevant to assessing Reef Ball productivity in the Masonville Cove, issues inherent to estimating productivity changes in areas that contain Reef Balls versus those that do not were considered. The most significant issue stems from vast differences in latitude between the Chesapeake Bay region and the majority of the studies conducted. Outside of the Bay region, Reef Balls have generally been used to repair actual reef systems, and the bulk of monitoring data reflects vastly different communities. Monitoring often includes nearby areas of damaged or healthy reefs in areas of greatly different salinities and tropical/sub-tropical conditions. Temperate fouling communities are much different in terms of community structure and “productivity”. However, a few monitoring studies that focus on an artificial reef in Delaware Bay that was created as mitigation for a dredged material disposal area were identified, and deemed the most appropriate in terms of general location (latitude).

The Delaware Bay studies examined productivity of artificial reefs relative to lost productivity in areas that had been inundated with dredged material (Burton et al. 2002, Steimle et al. 2002). The results of this study indicate that the artificial reef provides enhanced benthic secondary production per unit area (2,000–12,000 kcal/yr) over the lost habitat (177 kcal/yr). However, the overall reef installation was too small to completely mitigate for lost productivity. Steimle et al. (2002) compared the per area secondary productivity of the artificial reef to the per area productivity of nearby sand habitat. In this study, enhancement of productivity associated with the artificial reef varied annually, but the per area productivity of the reef epifaunal community was generally at least 20 times greater than the per area productivity of the nearby infaunal community.

Maryland Environmental Service and the MD Department of Natural Resources have installed Reef Balls to enhance/restore oyster productivity in various areas of the Chesapeake Bay. However, in terms of epibenthic habitat, many of the Reef Balls have been tremendously successful.

Studies directly applicable to the proposed installation of Reef Balls in Masonville Cove were not available. However, qualitative information on Reef Ball usage in the upper Chesapeake suggests that Reef Balls placed at Masonville Cove may be utilized by a variety of epibenthic species, including platform mussels. Additionally, studies of benthic secondary production from artificial reefs in the Delaware Bay suggest that installation of an adequate number of Reef Balls may result in secondary production from the reefs that is higher than that of the existing soft-bottom habitat.

MITIGATION PROJECT 4C
SHALLOW WATER SUBSTRATE IMPROVEMENT – MASONVILLE COVE

Location

The proposed submerged aquatic vegetation (SAV) habitat enhancement and planting is located in and adjacent to Masonville Cove in the Patapsco River (Figure 4). The hatching in Figure 4 is the area of depths less than two meters that would be suitable for SAV growth. Twenty-five acres of area within the Cove or adjacent to the proposed DMCF would be of suitable depth, and the plan would impact approximately 20 of the available acres.

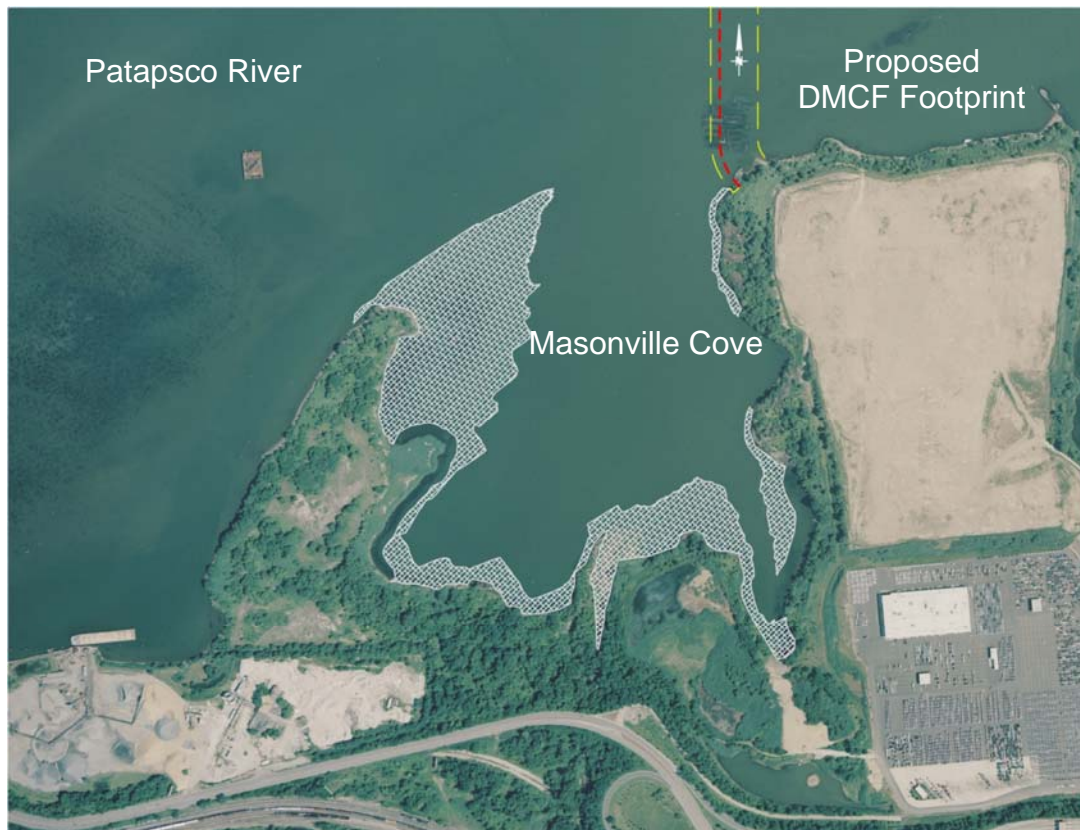


Figure 4. Potential SAV Habitat at Masonville

Description

Existing Conditions – (Ownership: State of Maryland) – SAV is sparse through out Baltimore Harbor. Existing conditions studies in Summer 2003 identified a very small patch of SAV in the southern part of Masonville Cove; the species was identified as the non-native Eurasian watermilfoil (*Myriophyllum spicatum*). The SAV patch had expanded significantly by the summer of 2004, comprising approximately half an acre of moderately dense growth. Spring and Summer 2006 SAV surveys will be completed to assess the full extent of SAV in Masonville Cove and the proposed Masonville DMCF footprint. Existing condition studies found that the waters within Masonville Cove provide refuge and forage opportunities for a variety of fish species including juvenile anadromous species, such as white perch (*Morone Americana*), striped bass (*Morone saxatilis*), yellow perch (*Perca flavescens*), and river herring (*Alosa pseudoharengus* and *Alosa aestivalis*), as well as forage species such as minnows, shiners, and silversides. White perch and young striped bass dominated the

open water collections in the area immediately outside the cove. The substrate consists primarily of fine grain material with small pockets of sand and areas of embedded debris. Salinities ranged from two to seven ppt; turbidity was highly variable.

Proposed Enhancement – (Scope: 20 Acres of Substrate Improvement) – Substrate would be improved by removing embedded debris and spreading of sand approximately seven to eight inches deep. Sand would be brought from an upland source approved for in-water placement.

Benefits – Improved substrate should allow any existing plants or propgules within Masonville Cove to expand naturally. SAV provides cover for crabs, juvenile and small fish, and foraging sites for larger fish species. All of the fish species known to use the cove and adjacent open water areas are species that would benefit from greater SAV occurrence within the Cove.

Challenges – The Maryland DNR SAV Restoration Targeting System output indicates that Masonville Cove may be unsuitable for SAV restoration, primarily because of poor light penetration. The reef improvements within the Cove should provide hard vertical substrate for encrusting bivalves such as platform mussels, which are known to occur within the Cove, or oysters, which are being established elsewhere in the Baltimore Harbor. Once bivalve colonies establish themselves in the area, their filter feeding is expected to improve water clarity.

Cost Estimate – It was assumed that 1,000 cubic feet of sand would be required per acre (\$20,000 per acre) to achieve approximately eight inches of surface coverage. The total cost for substrate improvements to 20 acres would be \$400,000. The only seeding per acre costs available were for species not suitable for the area; the cost estimate is \$16,000 per acre. If up to 10 acres are seeded, the additional cost for planting and monitoring (beyond substrate improvement) would be \$160,000 (seeding). No clean up costs are included in this estimate.

MITIGATION PROJECT 5

TERRESTRIAL HABITAT ENHANCEMENT AND DIVERSIFICATION – MASONVILLE COVE

Location

The proposed terrestrial habitat enhancements would occur along the shoreline and adjacent areas of the land side of Masonville Cove (Figure 5). There are approximately 54 acres of land area around Masonville Cove. Ten acres of the existing land area that is not included in other enhancements would be targeted for habitat improvement/diversification.

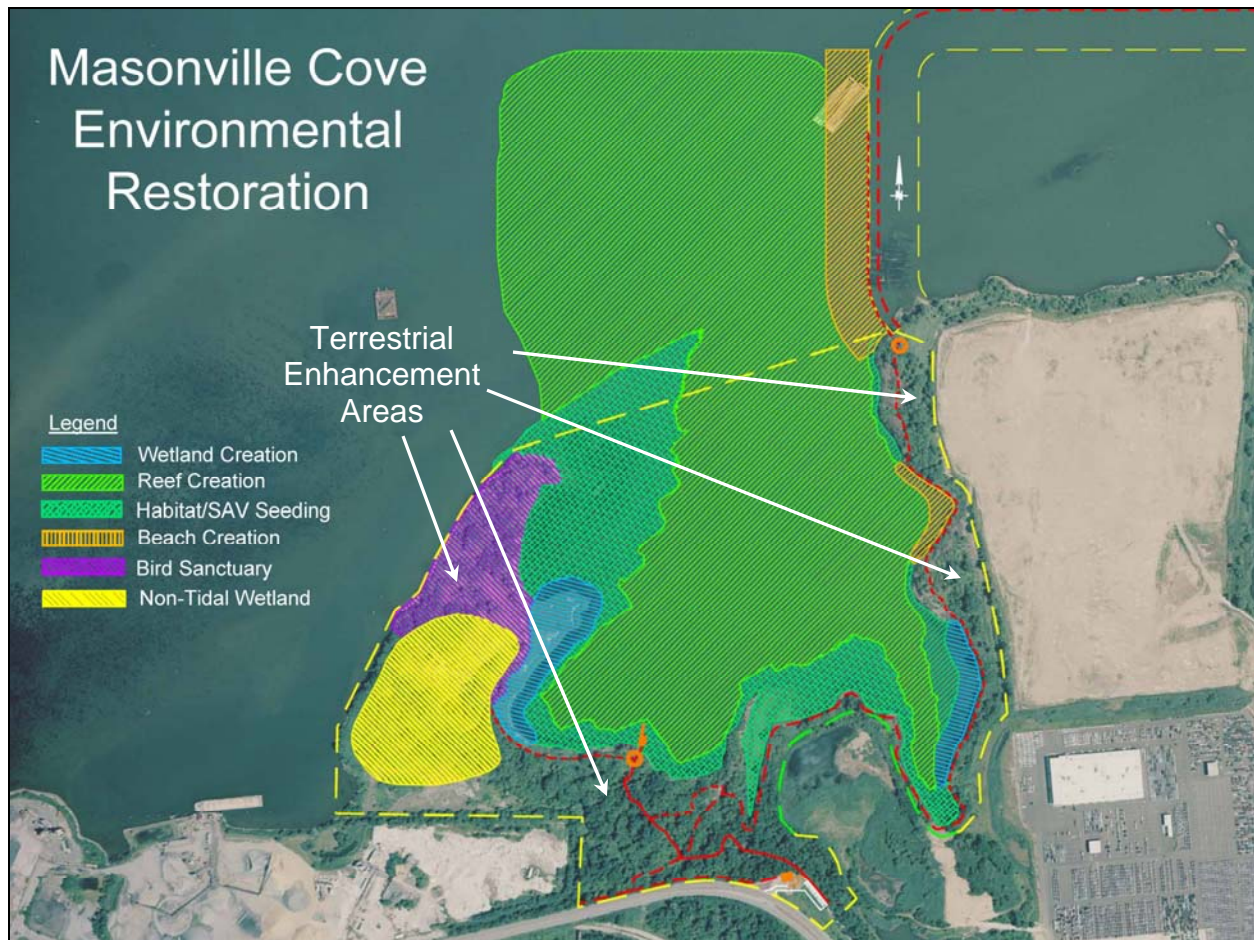


Figure 5. Masonville Terrestrial Habitat Enhancement Area

Description

Existing Conditions – (Ownership: State of Maryland) – Existing condition studies found that most of the vegetation is comprised of opportunistic species that are invasive, non-native, or both. The area is disturbed throughout. There are debris piles and discarded timbers, concrete, rubble, and other materials. Vegetation is sparse along the bulkhead and concrete-rubble shorelines. The narrow forested buffer has areas of dense vegetation along the perimeter. Most of the plants observed in this buffer and within the study area are native to moist, coastal, or wetland soils, which is consistent with

the site. Several of the species found are non-native species, such as royal paulownia (*Paulownia tomentosa*), tree-of-heaven (*Ailanthus altissima*), mulberry (*Morus rubra*), and curly dock (*Rumex crispus*). The dominant deciduous trees identified in the area, included black locust (*Robinia pseudoacacia*), sumac species (*Rhus* sp.), redbud (*Cercis canadensis*), and tree-of-heaven. Dominant herbaceous plants included common reed (*Phragmites australis*) and pokeweed (*Phytolacca americana*). Poison ivy (*Toxicodendron radicans*) was also present.

Proposed Enhancement – (Scope: 10 Acres adjacent to Cove) – Prior to the implementation of Mitigation Project 5, debris removal would occur as part of Mitigation Project 10. Soil augmentation would be required in some areas to support new plantings. The proposed enhancement includes retaining native plants with good habitat value, reducing the number of non-native species, and augmenting the plantings with a variety of trees, shrubs, and herbaceous plants recommended by the USFWS for coastal plain areas within Chesapeake Bay. The species proposed are plants that are known to do well in moist floodplain areas. The larger trees species would include species such as willow oak (*Quercus phellos*) and white ash (*Fraxinus americana*). Medium trees and shrubs would include persimmons (*Diospyros virginiana*), pignut hickory (*Carya ovalis*), Paw paw (*Asimina triloba*), eastern red cedar (*Juniperus virginiana*), American holly (*Ilex opaca*), sassafras (*Sassafras albidum*), groundsel tree (*Baccharis halimifolia*), dogwood (*Cornus* sp.), and arrowwood (*Viburnum acerifolium*). Herbaceous plants and grasses would include species such as rose mallow (*Hibiscus moscheutos*), black-eyed Susan (*Rudbeckia hirta*), switch grass (*Panicum virgatum*) and gamagrass (*Tripsacum dactyloides*).

Benefits – This project would improve density and diversity of plants in the Chesapeake Bay Critical Area buffer. This would provide direct cover and for opportunities for avian species. Larger trees, when mature, would provide nesting sites for eagles, which previously used the area, and other large tree nesters. This enhancement would also have indirect benefits to in-stream habitat by providing shading and improved bank conditions. Vegetation along shorelines also minimizes erosion and

Cost Estimate –

Assumptions:

400 trees and shrubs per acre: 70 percent trees, 30 percent shrubs

- 1 inch caliper trees cost \$150 each, planting costs \$100 each
- 5 gallon shrubs cost \$30 each, planting costs \$30 each

Seed mix for grasses and perennials (switch grass, black-eyed Susan, etc.)

- \$100 per pound
- 20 lbs per acre

The total cost per acre is approximately \$79,000 for plants and installation. Site preparation and soil augmentation would involve another \$5,000 per acre. Total per acre is approximately \$84,000. Assuming 10 acres would be affected, the estimated total cost is \$840,000.

MITIGATION PROJECTS 6 AND 7

BEACH CREATION IN MASONVILLE COVE AND ALONG DMCF DIKE

Location

The proposed beach is located along the western dike of the proposed Masonville DMCF project and within the Masonville Cove (Figure 6). The tan hatching in Figure 6 represents the areas proposed for beach creation.

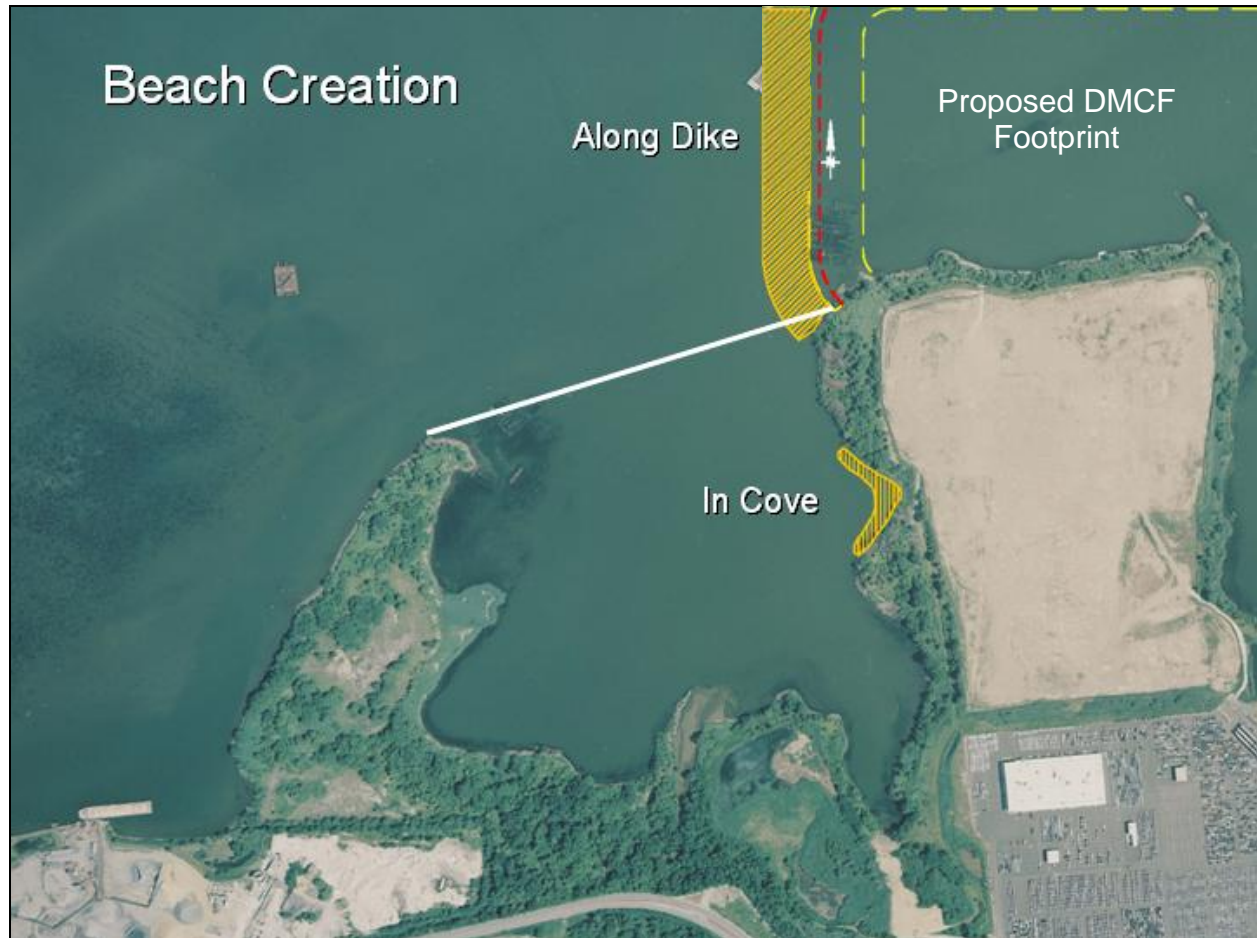


Figure 6. Beach Creation within Masonville Cove along DMCF Dike

Description

Existing Conditions – (Ownership: State of Maryland) – Existing condition studies found that there is minimal beach habitat in the area. Existing beach habitat is degraded due to poor water quality and excessive debris (e.g. trash and tires). Existing condition studies found that the waters within Masonville Cove provide refuge and forage opportunities for a variety of fish species including juvenile anadromous species, such as white perch (*Morone Americana*), striped bass (*Morone saxatilis*), yellow perch (*Perca flavescens*), and river herring (*Alosa pseudoharengus* and *Alosa aestivalis*), as well as forage species such as minnows, shiners, and silversides. The Cove also provides

foraging and resting opportunities for many bird species. Although waterfowl and wading birds are seasonally common, few shorebird species were encountered in seasonal observations.

Proposed Enhancement – (Scope: 5 acres along the Dike and 0.8 acres within Masonville Cove) – Improvement of habitat through placement of sand material to create a beach having a 20 ft wide berm and a slope into the water at a slope of 10:1. The slope above the berm would be planted with saltbush community vegetation. The beach would have a length of about 1500 ft along the dike and 500 ft within the cove. The sand would come from an upland source approved for in-water placement.

Benefits – The project would improve substrate conditions and increase beach habitat. Substrate improvements would improve benthic condition and fish foraging opportunities, which would benefit many of the fish species known to utilize the Cove. Improving the shore conditions would provide better habitat for SAV expansion and provide wading and shorebird foraging opportunities. Shorebird habitat, in particular, is currently lacking in the Cove.

Cost Estimate – The estimated costs to perform 0.8 acres of beach creation in the cove and 5.0 acres along the dike are \$112,000 and \$200,000, respectively.

MITIGATION PROJECT 8 EEL PASSAGES – PATAPSCO RIVER

Location

The proposed options would install eel passages at the areas specified by a star on the main-stem of the Patapsco River in Figure 7.

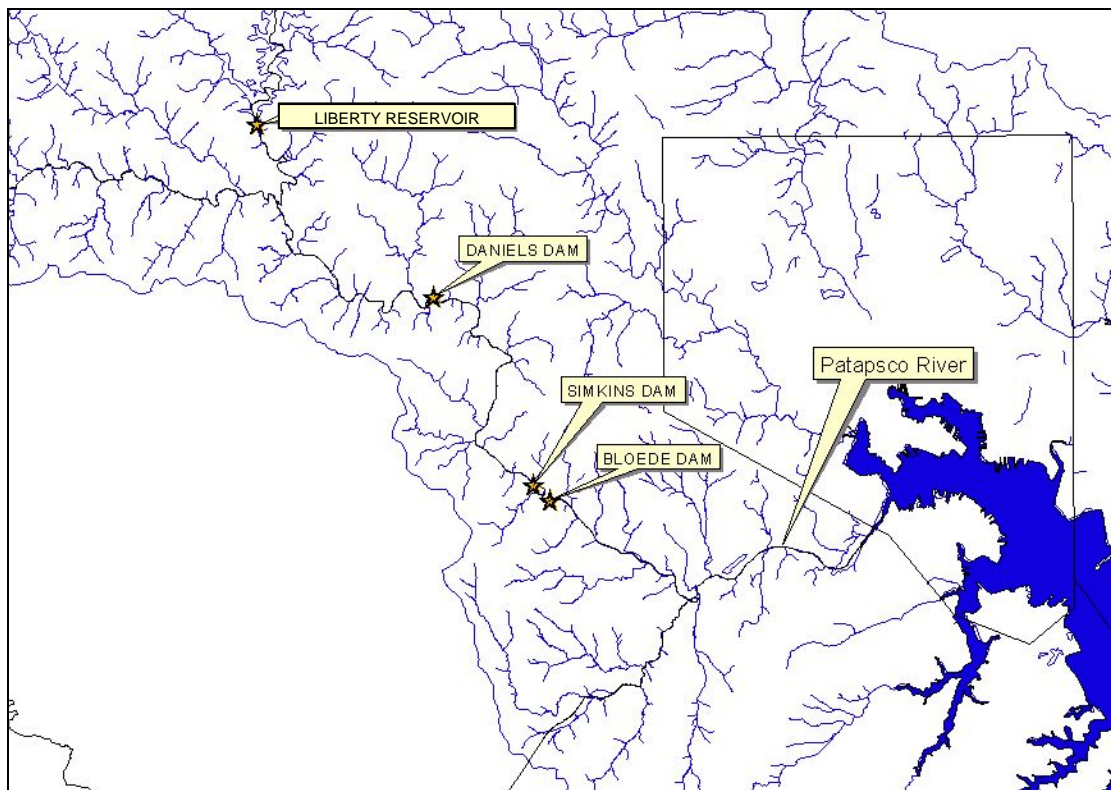


Figure 7. Map of Patapsco River Dams

Description

Existing Conditions – The American eel (*Anguilla rostrata*) occupies a significant and unique niche in the estuarine and freshwater habitats of the Atlantic coast. Eels ascend freshwater environments as juveniles. These fish reside in riverine habitats until reaching maturity, at which time they migrate to the Sargasso Sea, where they spawn once and die. Larval eels are transported by ocean currents to rivers along the eastern seaboard of the continent. Historically, American eels were very abundant in East Coast streams, comprising more than 25 percent of the total fish biomass in many locations. This abundance had declined from historic levels but remained relatively stable until the 1970s. Eel densities in surveyed tributaries have decreased since the 1980s and continue to decline. On July 6, 2005, the USFWS decided to review the American eel for possible listing on the endangered species list. Bloede dam is the first blockage on the Patapsco River that prevents American eel from accessing the nearly 300 square miles of watershed above the dam. Data collected by the Maryland Biological Stream Survey (MBSS) reveal that Bloede dam is a significant barrier to eel migration (Figure 8). Fish passage was constructed at the dam in 1991 but was designed for shad and herring and is ineffective

for eel passage. Simkins Dam and Daniels Dam located 0.5 and 7 miles upstream of Bloede Dam also prevent American eel from reaching upstream habitat.

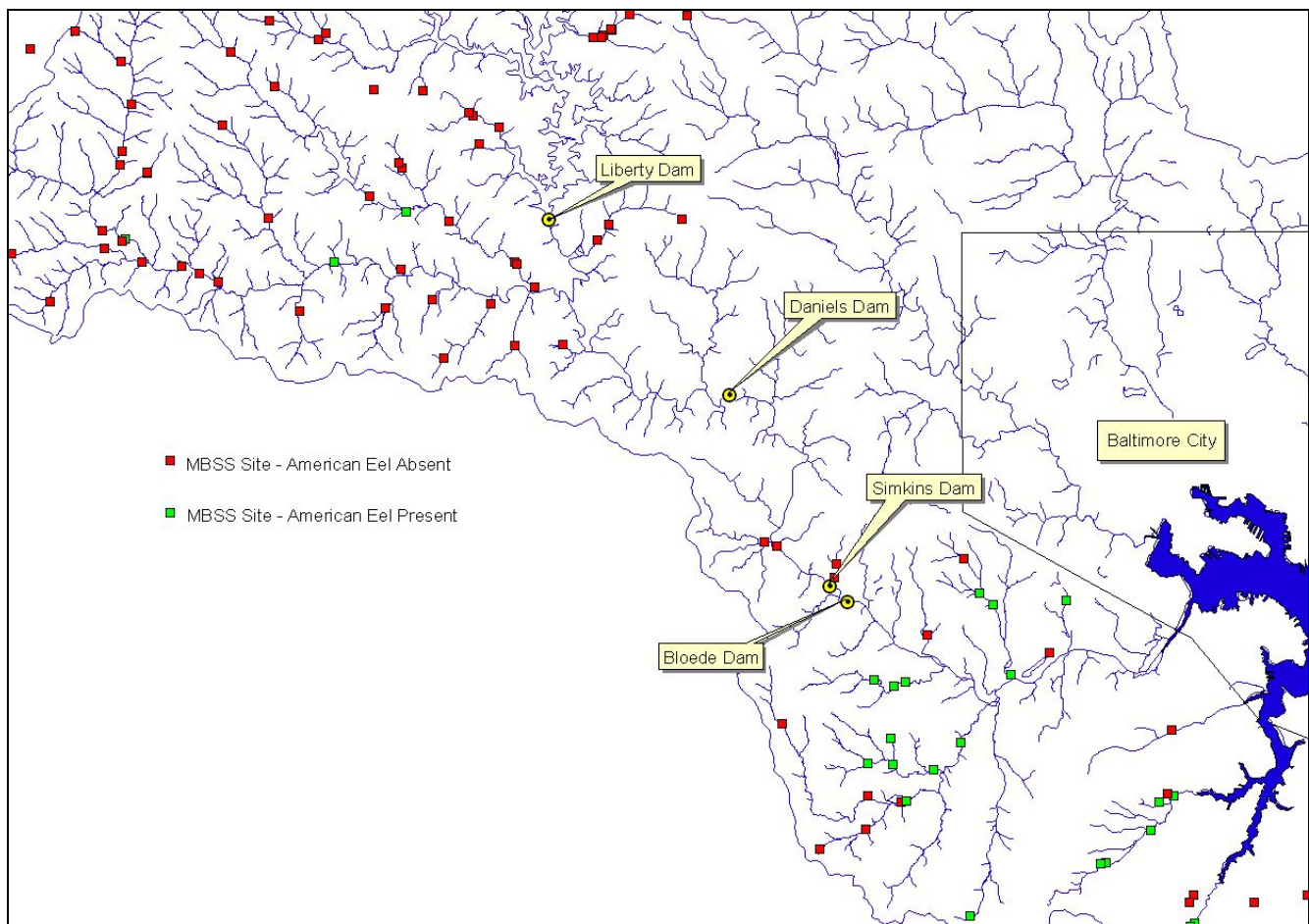


Figure 8. Presence and Absence of American Eel in MBSS Patapsco River Survey

Proposed Enhancement – Specialized modifications to existing infrastructure designed to accommodate eels is proposed for all three dams.

Benefits – Eel passage facilities constructed on three dams on the Patapsco River would allow eels to continue their migration upstream and would reopen a significant amount of habitat.

Cost Estimate – An eel passage was recently constructed at the Millville Dam on the Shenandoah River. Based on that project, eel passage could be completed for approximately \$100,000 per dam. The MPA is currently proposing funding for four of the available dams. The total estimated cost would be \$400,000.

MITIGATION PROJECT 9 SHAD AND HERRING RESTORATION

Location

The proposed anadromous species restoration would be conducted on the main-stem of the Patapsco River from Ellicott City, approximately two miles above Simkins Dam down to the mouth of the River (Figure 9).

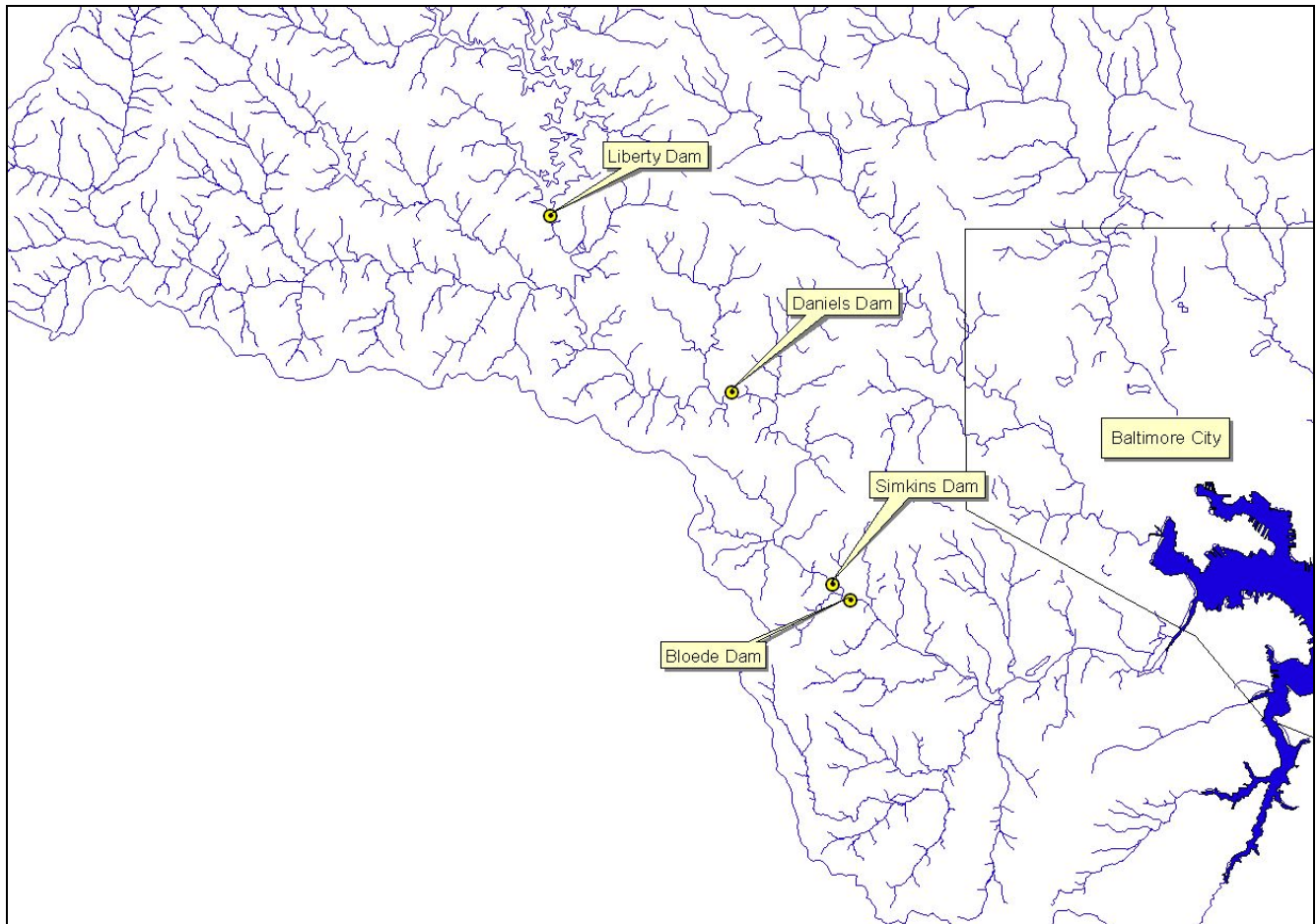


Figure 9. Map of Bloede Dam, Simkins Dam, and Daniels Dam on the Patapsco River

Description

Existing Conditions – American shad (*Alosa sapidissima*), hickory shad (*Alosa mediocris*), blueback herring (*Alosa aestivalis*) and alewife (*Alosa pseudoharengus*) are anadromous species that historically occurred in all tributaries of Maryland's Chesapeake Bay. These migratory species live most of their life in marine environments and return to tidal freshwater habitat to spawn. Most shad and herring species are assumed to return to spawn in their natal tributaries.

American shad was once the most important commercial and recreational fish species in Chesapeake Bay. In response to severe population declines from 1900 to the 1970s Maryland closed its fishery in

1980. Severely depressed or extirpated native adult stocks do not presently use most Chesapeake Bay tributaries, including the Patapsco River. Improvements in water quality, fishing moratoria and removal of many stream blockages have reopened potential shad spawning habitat. Because of their spawning characteristics, self-sustaining shad populations are not likely to return to tributaries without hatchery inputs.

Hickory shad experienced declining populations similar to American shad. A Maryland fishing moratorium was placed on hickory shad in 1981. The Upper Bay has a robust spawning population of hickory shad but it has not expanded to include lower Bay tributaries. Based on previous experience with hickory shad restoration in other tributaries, hatchery inputs could reintroduce a self-sustaining spawning population to the Patapsco River.

Blueback herring and alewife (these species are often referred to as river herring) historically occurred in the Patapsco River. They are an important resource in the Bay ecosystem and provide forage for predators such as rockfish. Fish passage construction at Bloede Dam and Simkins Dam has opened significant potential herring spawning habitat. Stocking hatchery-cultured river herring could reintroduce spawning populations to Patapsco River.

Proposed Enhancement – A) Produce, mark and stock cultured American shad, hickory shad and river herring in Patapsco River. River herring would be stocked as larvae and shad species would be stocked as larvae and juveniles. All stocked fish would receive a mark that would positively identify a fish as hatchery origin. B) Monitor the abundance and mortality of larval and juvenile shad and herring using marked hatchery-produced fish. C) Estimate the contribution of hatchery fish to the adult spawning population and monitor recovery of naturally produced stocks.

Benefits – Hatchery inputs are intended to provide adult spawners that would produce self-sustaining populations in the target tributary. Restoring shad stocks to tributaries that historically supported runs would increase fishing opportunities for anglers. Restoration of these species through hatchery stocking would fill an important niche in the Chesapeake Bay ecosystem.

Cost Estimate – The budget includes a one-time expense for hatchery upgrades and three years of culture, stocking and monitoring costs. Repairs and upgrades to Manning and Cedarville fish hatcheries (pond lining, valve repairs) estimated at \$300,000. Culture costs are estimated at \$50,000 per year (three years recommended). Monitoring and assessment costs are estimated at \$100,000 per year. Three years are required to assess herring and hickory shad adults. The total cost for fish stocking efforts is estimated to be \$750,000.

**MITIGATION PROJECT 10
LANDSIDE AND WATER – PHASE I CLEANUP**

Location – The proposed remediation and removal of debris is located along the shores of the Masonville Cove in the Patapsco River. The hatching in Figure 10 shows the anticipated area for landside cleanup. The water cleanup area could include any portion of the Masonville Cove.



Figure 10. Phase I Cleanup at Masonville

Description

Existing Conditions – (*Ownership: State of Maryland*) – The area is debris ridden. Examples of debris are concrete pipe, railroad ties, and scrap metal. Test pitting is being performed to determine if any contamination is on site.

Proposed Enhancement – The enhancement proposed is removal of large debris from the site. Remediation would also be done, if necessary pending the results of test pits. The site would meet residential soil standards.

Benefits – The enhancements would prepare the area for use as a recreational park, providing the community with access to a safe and aesthetically pleasing natural area.

Cost Estimate – The costs for Phase I cleanup cannot yet be estimated, as site investigations are underway. The cost for this cleanup has been capped at \$2,500,000.

Status – Conceptual cost estimates are completed. Test pitting is being performed to determine if any remediation is necessary. Awaiting decision to do further investigations.

MITIGATION OPTION 11

MASONVILLE ENVIRONMENTAL EDUCATION AND NATURE CENTER AND TRAILS ALLOCATION

Location

The proposed Masonville Environmental Education and Nature Center and trails (Figure 11). Figure 11 depicts the proposed location of the Environmental Education and Nature Center building and the route of the proposed trails.

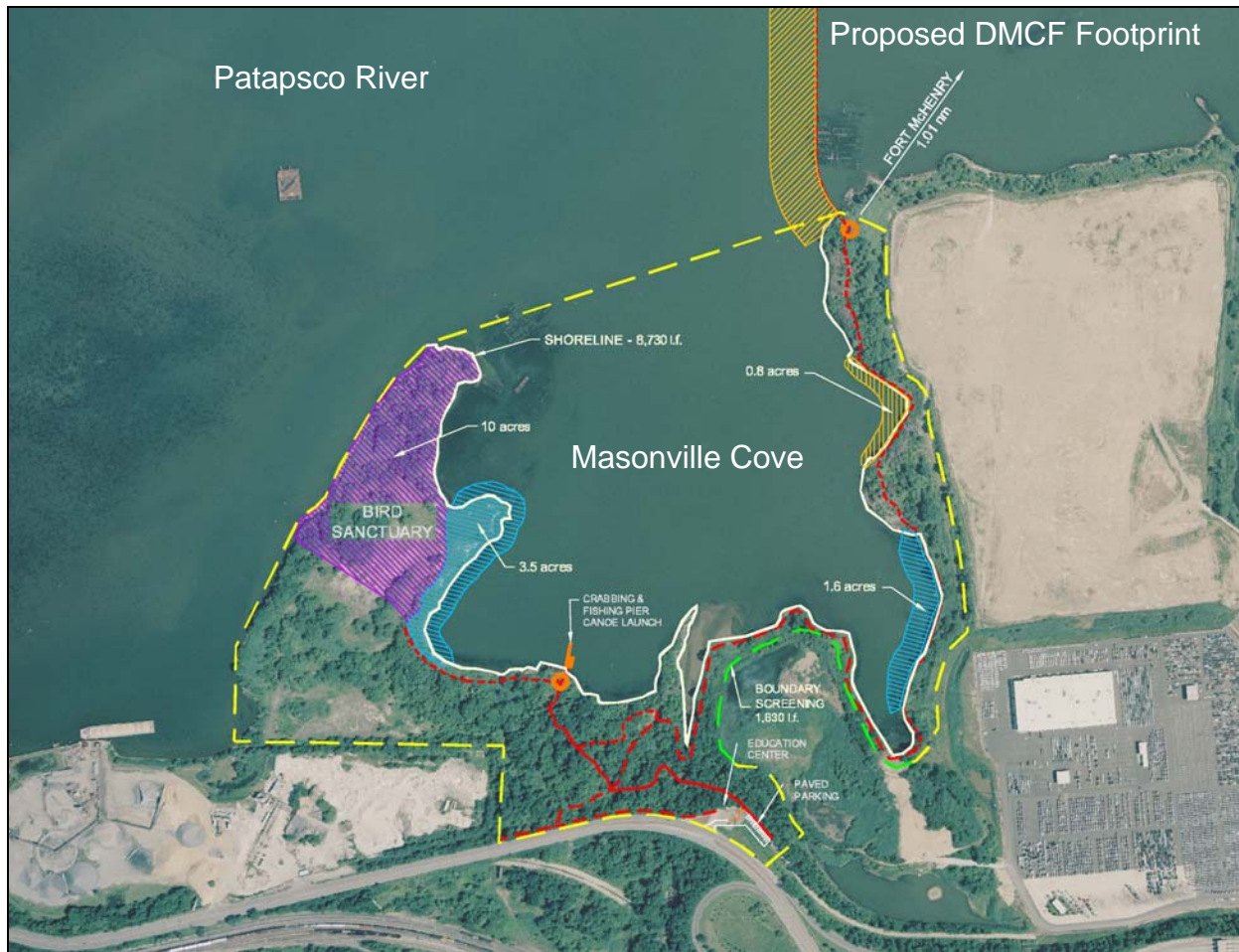


Figure 11. Environmental Education and Nature Center and Hike and Bike Trails in the Masonville Cove and Brooklyn areas

Description

Existing Conditions – (Ownership: State of Maryland) – Currently, public access onto the land surrounding Masonville Cove is restricted to only authorized individuals. The land and shoreline are undeveloped and littered with railroad ties, rusted metal and other debris. The Cove serves as a unique waterfowl staging area during the winter months when up to 10,000 waterfowl have been observed at

one time. The land area surrounding the Cove provides habitat for a limited amount and diversity of wildlife including deer and fox.

Proposed Enhancement – The Masonville Environmental Education and Nature Center would be a two story building approximately 30 ft by 40 ft, including a 700 sq ft of deck, approximately 1,500 feet (ft) of handicapped access trail to the water's edge, and possibly an additional 8.300 ft of trails (Figure 11).

Benefits – The construction of an environmental education and nature center on the land adjacent to Masonville Cove property would provide the Brooklyn and Curtis Bay communities with their local only access to the Patapsco River. The building would house environmental educational programs for their school children and their adult residents. As these children and adults learn about this unique natural area and participate in the cleanups, wetland plantings, and other activities, it is likely that their behavior toward the environment would improve.

The kayak and canoe pier would connect Masonville Cove to the Chesapeake Waterways program and all of the behavior changing activities offered by that program.

Cost Estimate – *The estimated cost to construct the environmental education and nature center with the deck and peripheral facilities is \$750,000.*

MITIGATION PROJECT 12

MASONVILLE COVE EDUCATION/RESEARCH ALLOCATION

Location

The proposed education and research would be conducted from the Masonville Environmental Education Center (Figure 11).

Description

Existing Conditions – The education center at Masonville Cove provides an opportunity to combine citizen involvement, public awareness, education and research while filling data gaps in the scientific and mitigation design community. The project would use trained volunteers to collect scientifically valid data whereby increasing monitoring effort at many more wetland sites and for a longer period of time to improve assessment of mitigation success. Extensive public involvement in tidal wetland restoration also fulfills several additional objectives, including hands-on education opportunities and regular site maintenance. The goal of this program is to improve design and understanding of how created tidal wetlands function so that future mitigation sites, particularly those in urban areas, achieve a higher degree of success.

It is anticipated that this detailed hydrologic assessment, construction, and public involvement in the restoration, maintenance, and monitoring would provide useful information to improve tidal wetland mitigation design in urban tributaries such as the Patapsco River.

Cost Estimate – The cost of the education and research would vary greatly depending on the extent of the programs. Currently, \$500,000 has been allocated for the effort.

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MITIGATION PROJECT 13

WATER QUALITY MONITORING AND HABITAT ASSESSMENT – MASONVILLE COVE

Location

A water quality monitoring stations would be placed in the Patapsco Rive near Masonville Cove (Figure 12).

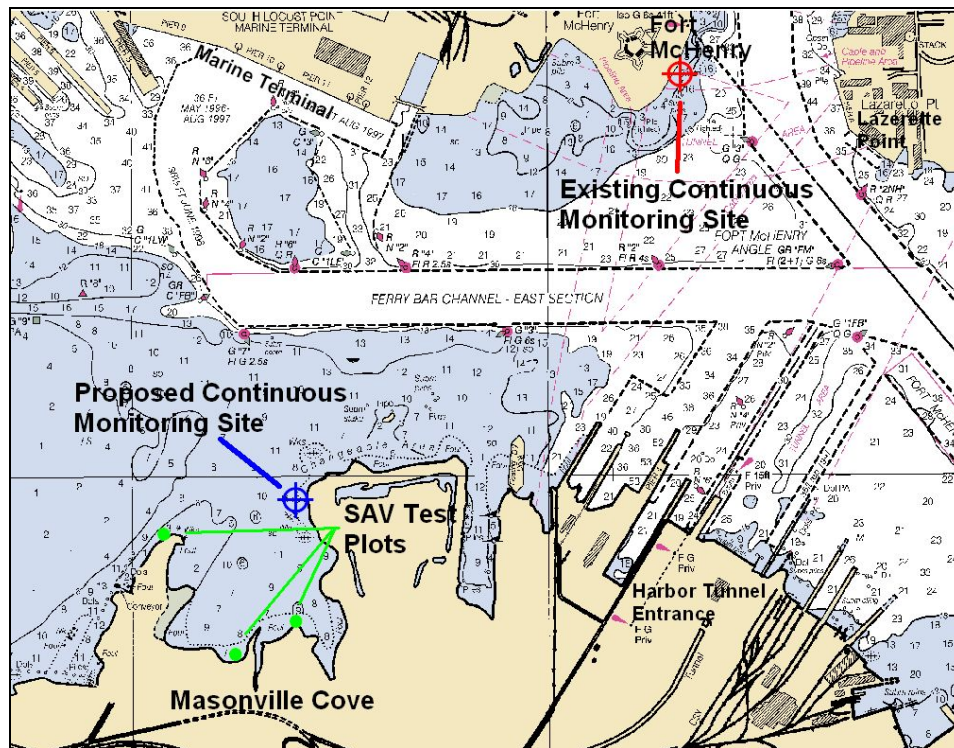


Figure 12. Locations of Existing and Proposed Continuous Monitors

Description

Existing Conditions – DNR evaluates estuarine habitat conditions (a full suite of water quality chemical and physical parameters) throughout the Chesapeake Bay for a variety of purposes, including suitability of the habitat for living resources [fish, submerged aquatic vegetation (SAV), etc], identification of problem areas, tracking of restoration progress, and attainment of water quality criteria for regulatory purposes. Sites for assessing these conditions on the Patapsco River currently consist of one long-term site near the Key Bridge and a recently added continuous monitoring site at Fort McHenry (Figure 13). These two sites are adequate for evaluating conditions on a bay wide scale, but not for evaluating conditions on local scales such as the Masonville Cove project. Also, suitability for SAV restoration is unknown in Masonville Cove with existing data.

Proposed Enhancement – The Maryland DNR proposes adding two assessment components to the area. First, a new continuous monitoring site would be added within Masonville Cove (Figure 12). This site would monitor six key habitat components within the Cove every 15 minutes from April to October. Results would be telemetered in real-time to the DNR website and viewable on-line at www.eyesonthebay.net. Key nutrients would be collected at Masonville Cove as the continuous monitoring instrument is serviced (every two weeks at each site using the same protocols as

established by DNR Chesapeake Bay Wide Shallow Water Monitoring Program). DNR would provide annual reports on results of the assessments. Real-time continuous monitoring results would be viewable from a kiosk at the Masonville Education Center. Example of Continuous Monitoring Data http://mddnr.chesapeakebay.net/newmontech/contmon/eotb_results_graphs.cfm?station=mchenry

Second, DNR would install SAV test plots as called for in the Chesapeake Bay Program's SAV Restoration Strategy and monitor them for two years. A final report would discuss results from the continuous monitoring and SAV test plots and assess specific locations and feasibility of large-scale restoration.

Benefits – The proposed assessments would provide several critical functions. First, they are an essential component of targeting and implementing SAV restoration projects. Second, they are the means by which we track progress of restoration projects. Third, they are the means by which Maryland would be assessing attainment of the new Chesapeake Bay water quality criteria recently agreed to by the USEPA. Finally, they serve as an important education and outreach tool to the public.

Cost Estimate

Monitoring of this nature is generally carried out for a minimum of three years

	<u>YEAR 1</u>	<u>YEAR 2 AND FOLLOWING</u>
Equipment (2 YSI 6600 EDS with telemetry):	\$28,000	
Supplies	\$1,500	\$1,500
Travel	\$1,500	\$1,500
SAV test plots	\$4,000	
Nutrient analysis and calibration costs	\$6,000	\$6,000
Kiosk	\$15,000	
Staff Time (one FTE per year)	<u>\$40,000</u>	<u>\$40,000</u>
TOTAL	\$96,000	\$49,000

Three year implementation phase:

Costs of large-scale SAV restoration would depend upon technique. Seeding costs are approximately \$16,000 per acre. Tubers or whole plants costs are approximately \$30,000 per acre. Staff time would be an additional \$30,000 per year (1/2 FTE) for up to 5 acres of restoration.

The total cost of this option is \$194,000, which includes the costs outlined for year one above (totaling \$96,000) and two years of continued monitoring at \$49,000 per year.

**MITIGATION OPTION 14
CONSERVATION EASEMENT – MASONVILLE COVE**

Location

The proposed Conservation Easement would cover approximately 50 acres of land surrounding Masonville Cove. (Figure 13).



Figure 13. Conservation Easement Boundary

Description

Existing Conditions – (Ownership: State of Maryland) – Currently, the land surrounding Masonville Cove is owned by the Maryland Port Administration (MPA) and is zoned industrial. It is undeveloped at the present time but may soon be the focus of a significant cleanup effort. Additionally, environmental education programs would be conducted from a building to be constructed on site. The adjacent land uses include a port terminal for automobile storage and a sand and gravel operation. Existing condition studies found Masonville Cove to be a unique natural area within Baltimore City. The Cove provides foraging and resting opportunities for many bird species. Waterfowl are common in winter months and herons and egrets are common in warmer months. Song birds and raptors are also utilizing the site, particularly in warmer months. Existing condition studies found that the waters within Masonville Cove provide refuge and forage opportunities for a variety of fish species including juvenile anadromous

species, such as white perch (*Morone Americana*), striped bass (*Morone saxatilis*), yellow perch (*Perca flavescens*), and river herring (*Alosa pseudoharengus* and *Alosa aestivalis*), as well as forage species such as minnows, shiners, and silversides. The south shore of the Patapsco River has been identified by NMFS as an important anadromous fish nursery area.

Proposed Enhancement –Conservation Easement on over 50 acres.

Benefits – The conservation easement would prevent the land from being used for any purposes except for environmental education and related activities. The only structures constructed on site would be to support these activities. Preservation of this area would be consistent with the habitat conservations goals of Baltimore City and provide a unique natural area within the urban setting. Preservation of the shoreline and terrestrial habitat areas would continue to support the fish and wildlife species known to occur there as well as protect any future habitat improvements and fish and wildlife utilization.

Cost Estimate – The estimated value of the land to be eased is \$56,700 per acre or \$3.1 million. This number comes from the Maryland Real Property data available on line through the state department of taxation.

TRASH INTERCEPTORS – MIDDLE BRANCH OF THE PATAPSCO

The proposed trash interceptors are located in the northern portion of the Middle Branch of the Patapsco River (Figure 14).

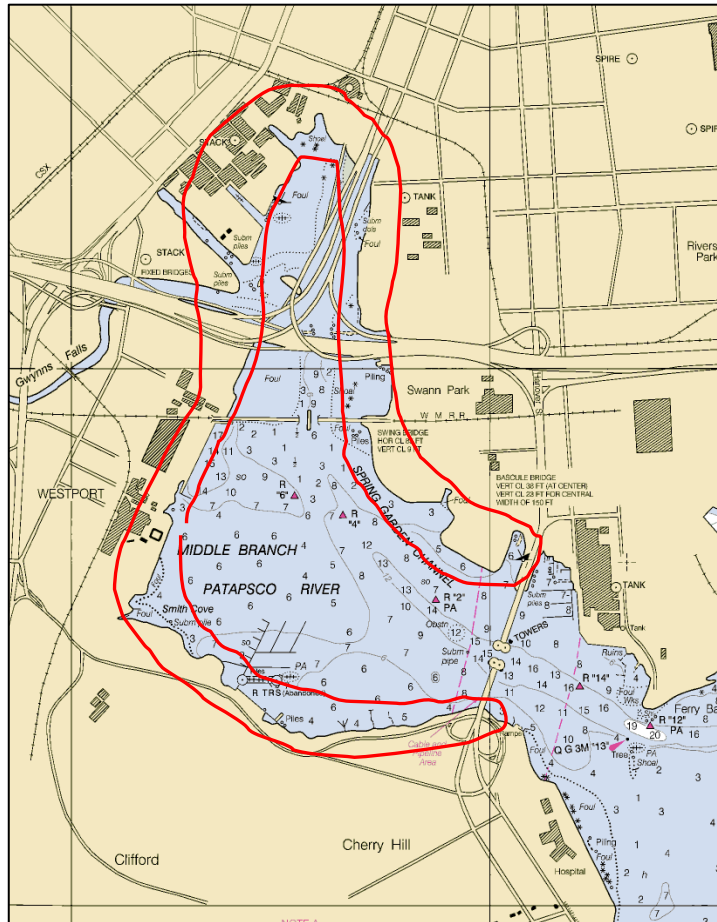


Figure 14. Potential Trash Interceptor Location

Existing Conditions – (Ownership: Baltimore City) – Storm drain outfalls in Baltimore City carry large quantities of trash and debris into the Patapsco River and its tributaries. There are 15 outfalls located in the Middle Branch of the Patapsco. Of the 15 outfalls, five are north of the I-95/I-395 intersection. Currently, there are few trash collection devices on outfalls in the Patapsco and none within the Middle Branch.

Proposed Enhancement – The project would include construction of a trash interceptor at one or more outfalls in the Middle Branch. The trash interceptors would consist of a netting system to catch trash and debris prior to it entering the Middle Branch. The interceptors would be emptied every two weeks and after major events. The trash would be disposed of as municipal waste.

Benefits – The interceptors would remove the trash from the outfalls in the Middle Branch of the Patapsco. Removal of debris and trash increases survivability of wetlands in the watershed, reduces future buildup of debris along shorelines, and provides aesthetic benefits to the community.

Cost Estimate – The estimated costs for trash interceptors in the Middle Branch range from \$300,000 to \$1,000,000. Costs vary based on the size of the outfall and the structure required to construct the interceptor. In addition to initial construction costs, approximately \$25,000 per year would be required for emptying and maintaining each interceptor. The potential credit for installation and maintenance of trash interceptors is unknown; therefore a per-acre cost can not be calculated at this time. However, the MPA estimates that three trash interceptors would be constructed at \$500,000 each, and the MPA would pay for \$50,000 of maintenance costs for five years.

PROJECT 16 – ENVIRONMENTAL BENEFIT OF THE PROPOSED MASONVILLE DMCF SEDIMENT/CONTAMINANT ENCAPSULATION

Location

The location for sediment encapsulation would be the area within the proposed DMCF footprint. This is indicated by the blue line in Figure 15. See existing conditions for a description of this figure.

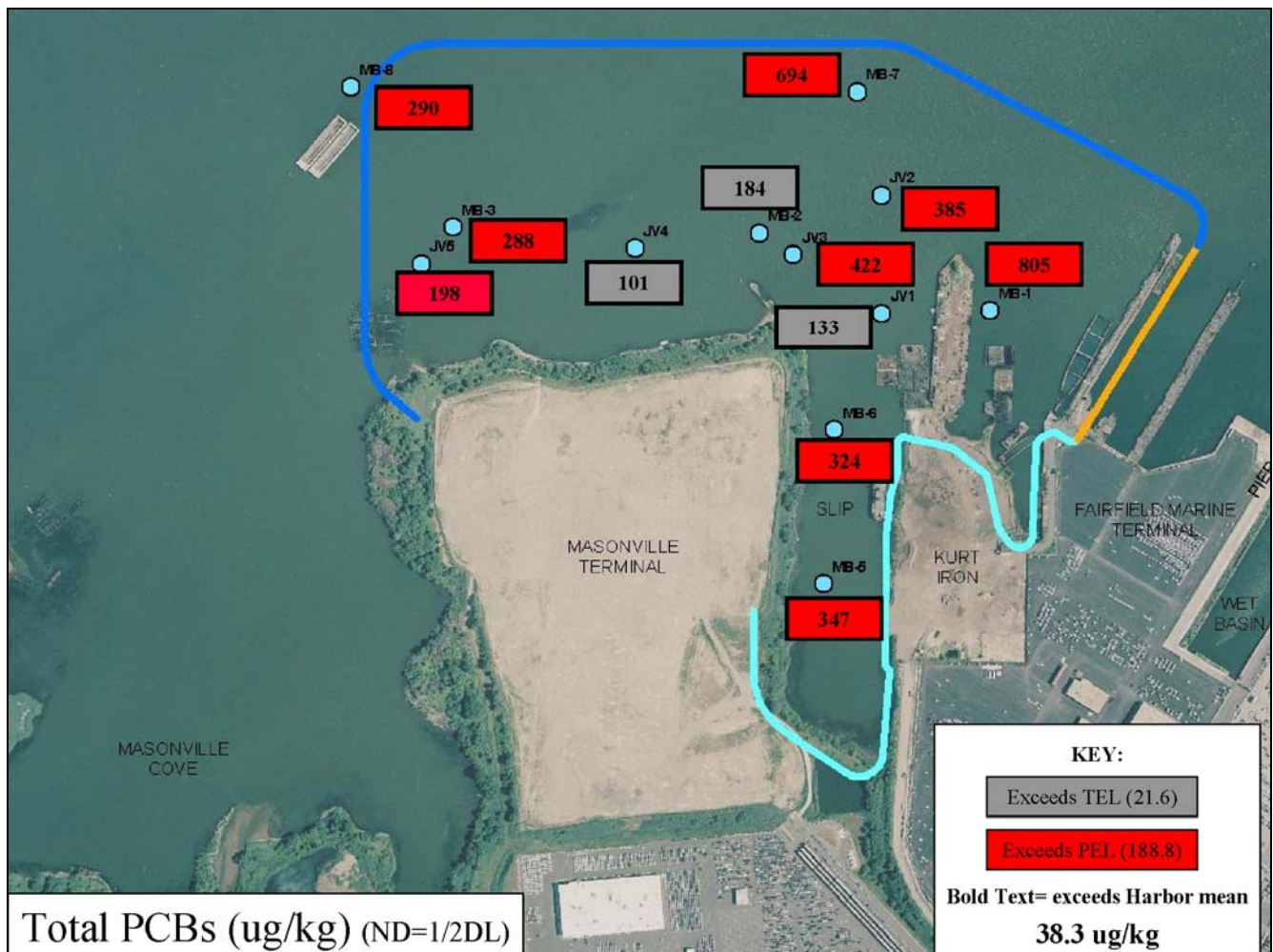


Figure 15. Masonville Surficial Sediment Contamination

Description

Existing Conditions – (Ownership: State of Maryland) – The surficial sediment quality within the proposed Masonville DMCF footprint is highly degraded due to elevated levels of some contaminants. The extent of surficial PCB contamination is shown in Figure 15. The areas that include red boxes are places where PCB concentrations exceed the level where a biological or ecological effect is likely. Several metals (including mercury, copper, and lead) were also found to be elevated within this area. The contaminant levels are having an effect on the biological community. Benthic communities within the DMCF footprint are degraded or very degraded in most areas. The presence of these contaminants in the surficial sediments makes them available for ingestion by benthic invertebrates and fish which

mobilizes them within the ecosystem making them available for higher level predators, including humans. There are consumption advisories within the Patapsco estuary for various fish species and crabs due to PCBs and certain pesticides.

Proposed Enhancement – (Scope: 126 acres of river bottom within the Patapsco estuary) – This proposed enhancement does not involve any additional work but is an added benefit of site development. The proposed alignment would enclose 126 acres of contaminated Patapsco river bottom, effectively encapsulating the contaminants and sequestering them from the estuary.

Benefits – Encapsulation of sediments would significantly reduce the toxics burden in this part of the Patapsco River, making contaminants such as metals (including mercury) and PCBs less available to the aquatic environment. This would have a direct benefit on the benthic community and availability of food resources for fish. Indirectly, the action would also make the contaminants less bioavailable for accumulation in fish tissue, lowering the potential human health and ecological risks associated with consumption of contaminated fish. The Patapsco River is currently under consumption advisories for several species because of PCBs, pesticide, and other toxin accumulations in fish tissue. Removing a source of these contaminants from the River would be beneficial to harvestable resources and to anything consuming them.

Cost Estimate – No incremental costs beyond site development.

**PROJECT 17 – ENVIRONMENTAL BENEFIT OF THE PROPOSED MASONVILLE DMCF
DERELICT VESSEL REMOVAL AND REMEDIATION**

Location

The former Kurt Iron and Metal (KIM) facility lies to the east of the proposed Masonville DMCF site. Currently 25 vessels in various states of disrepair are associated with the site (Figure 16).



Figure 16. Derelict Vessels in the Vicinity of the Former Kurt Iron and Metal Facility

Description

Existing Conditions – (*Ownership: most unknown, two belong to State of Maryland*) – KIM was purchased by the MPA in September 2000 to expand port facilities and has known legacy contaminants from the previous owners. The major area of environmental concern is KIM channel, which has 25 sunken and derelict vessels, a steel dry dock, and numerous barges with various materials on board. The ownership of most of the derelict vessels is not clear. Only three of the vessels were legally transferred with the property and are currently owned by the MPA. MPA conducted an in-

depth investigation of the materials including sampling each of the 25 vessels structures, drydock, and sediments beneath the drydock and debris piles. The primary regulated materials of concern associated with the structural materials of the vessels and dry dock include lead paint, PCB contaminated transformers and paint, asbestos, and various petroleum products and wastes.

The waste products are undoubtedly being released into the adjacent waters. Surficial sediment contaminants studies in the vicinity of the former KIM facility have demonstrated elevated levels of PCBs and some metals. The contaminant levels are having an effect on the biological community (e.g. degraded benthic communities). In addition, contaminants in the surficial sediments are available for ingestion by aquatic organisms and mobilization within the ecosystem (e.g. in tissues of fish and crabs). There are consumption advisories within the Patapsco estuary for various fish species and crabs due to PCBs and certain pesticides.

Proposed Enhancement – (Scope: Removal of bulk regulated wastes; burial of ship hulks) – At this time, MPA proposes to remove regulated and hazardous wastes from the ships and drydocks and dispose of them properly in licensed landfills. The solid wastes that remain, primarily steel and timber ship hulls, are to be minimally processed and relocated as necessary inside the footprint of the proposed Masonville DMCF. Depending on costs (demolition and refloating costs and unit credit for scrap steel) at the time of the vessel remediation project and schedule durations, some derelict vessels may be processed offsite. A plan is under development for remediating, removing, or burying the remaining vessels after the hazardous materials have been removed to the satisfaction of MDE.

Benefits – Remediation of the vessels would remove a significant source of toxics within the area and reduce the toxics burden in this part of the Patapsco River. This would effectively make making contaminant such as metals and PCBs less available to the aquatic environment. Reductions of these contaminants would directly benefit the benthic community and fish forage availability. Indirectly, the action would also make contaminants less bioavailable for accumulation in fish tissue, lowering the potential human health and ecological risks associated with consumption of contaminated fish. The Patapsco River is currently under consumption advisories for several species due (primarily) to PCB and pesticide tissue accumulations. Removing a source of these contaminants from the River would be beneficial to harvestable resources and (indirectly) to anything consuming them.

Cost Estimate – Cost estimates vary widely due to some uncertainties about the volumes of some of the wastes. Currently, estimates are \$5 to \$10 million dollars.

ATTACHMENT M-3

ADDITIONAL MITIGATION PROJECTS EVALUATED BY THE BEWG

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Table 1. Agency Ranking of Mitigation Projects Outside of Masonville Cove

Ranked Order	Description	Priority Ranking						
		MDE	DNR	MGS	EPA	NMFS	FWS	Total
1	Eel Passage (Bloede, Simpkins, Daniels, Liberty Reservoir)	1	1	1	1	1	2	7
2	Shad and Herring Restoration	3	2	2	2	2	1	12
3	Trash Interceptors (Gwynns Falls)	2	3	3	3	3	8	22
4	Stream Restoration (Western Run@Cross Country Blvd.,3,500 ft.)	5	4	4	5	8	5	31
5	Stream Restoration (Western Run@Kelly Ave.,1,100 ft.)	4	5	5	6	7	6	33
5	Rebuild 3-4 Outfalls	6	6	6	4	4	7	33
7	Seton Keogh High School Wetland Project	7	7	7	8	5	4	38
8	Sediment Remediation (Environmental Dredging/Capping)	8	8	8	7	6	3	40

Notes: These options were presented at the November 8th 2005 BEWG meeting, and the members of the group ranked them in order of priority from one to eight based on their preference. The "Priority Ranking" column gives the priority assigned by each agency represented at the meeting. The values assigned were totaled and the options were then ranked, with the lowest score being the most favorable. The first three projects listed in this table were added to the conceptual mitigation package and fact sheets were included in attachment M-3.

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FACT SHEET

SEDIMENT REMEDIATION (ENVIRONMENT DREDGING AND CAPPING)

Location

Environmental dredging and capping would be performed in the Middle Branch of the Patapsco River (Figure 1) or other applicable areas.

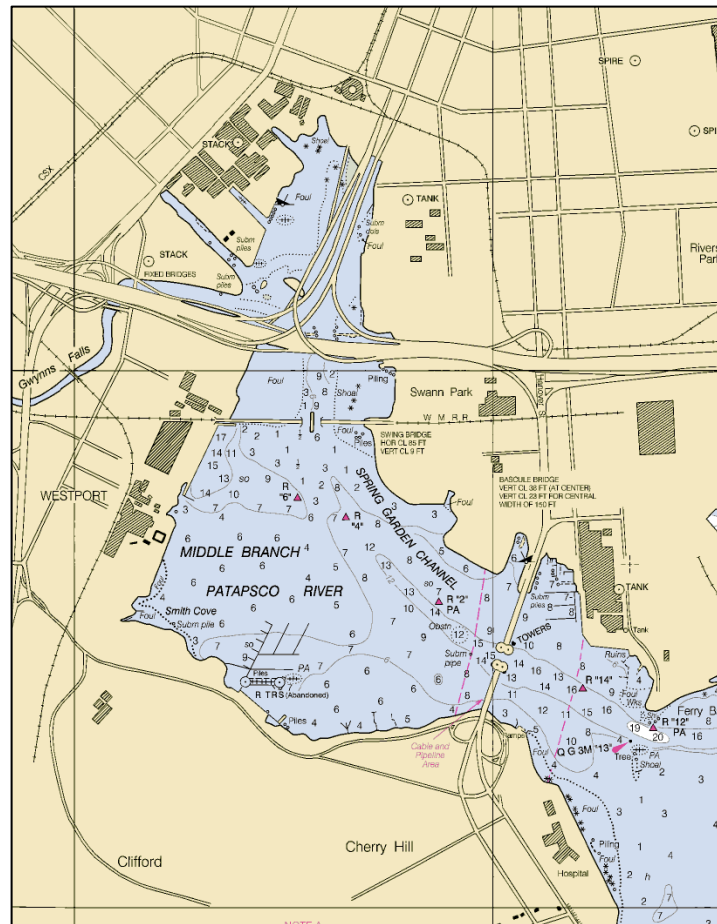


Figure 1 – Environmental Dredging and Capping in the Middle Branch of the Patapsco River

Description

Existing Conditions – (Ownership: State of Maryland) – Sediment portions of the Middle Branch of the Patapsco River contains elevated concentrations of toxic organics and heavy metals. The depth of sediment requiring dredging would need to be determined through investigation on a case-by-case basis. However, for estimation purposes, 5 ft is assumed in this fact sheet.

Proposed Enhancement – The project would include either dredging the sediment or capping with clean sand. The depth of dredging needs to be determined. Capping would be with approximately a 3-foot layer of sand.

Benefits – Removing or capping the sediment would eliminate a source of contaminants to the Patapsco River and Chesapeake Bay system.

Cost Estimate – The estimated cost for environmental dredging is about \$75 per cubic yard; thus for 1 acre of 5 ft of excavation the cost would be about \$480,000. The cost for capping would be about \$25 per cubic yard of sand; thus for one acre (a three foot sand cap and 30 percent losses) the cost would be about \$160,000.